

DETAILED ACTION

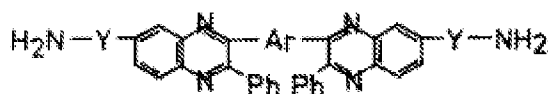
Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

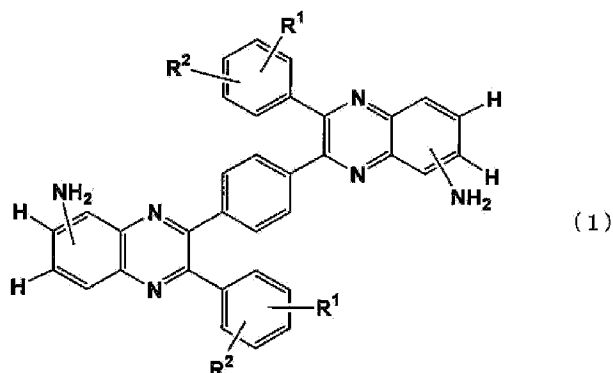
Claim 1-2 is rejected under 35 U.S.C. 103(a) as being obvious over Korshak et al (Polyamidophenylchinoxaline, Acta polymerica³⁴(1983), pp 213-215) herein Korshak.

Korshak teaches the following compound (see Scheme 1):



Where Y is direct bond (see page 213) and Ar and Ph are benzene rings.

The above compound represents an isomer of claimed compound 1:



where R1 and R2 are Hydrogens.

The difference between two above structures is that the amino groups in the Application are present at the ortho-position, whereas in Korshak's disclosure it is at meta- position with respect to the position of the nitrogen atoms in the quinoxaline moiety.

However, both compounds are structural isomers.

In accordance to MPEP 2144.09 the structural analogs are *prima facie* obvious in the absence of showing unexpected results.

Therefore, it would have been obvious to a person of ordinary skills in the art to interchangeably use Korshak's and Applicant's diamines, since they are structural analogs.

Regarding claim 2, Korshak does not teach the diaminobenzene compound as defined in claim 2, where R1 and R2 each independently denotes a C1-20 alkyl group, C1-20 alkoxy group, or C1-20 fluoroalkyl group.

Note that limitations of Claim 2 permits R1 and R2 to be C1 (Methyl) alkyl group.

In a case law (see *re Lohr* (CCPA 1963) 317F2D 38, 137 USPQ 548) related to a similar substitution, replacement of two Hydrogen groups to methyl groups was decided unpatentable, since unexpected results due to the above substitution were not shown.

Therefore, it would have been obviously to a person of ordinary skills in the art to interchangeably use methyl substituted or unsubstituted the diaminobenzene compound unless unexpected results due to the above substitution were shown.

Claims 3-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hamciuc et al (Compared properties of fluorinated heterocyclic copolyimides, Journal of Macromolecular Sci, Part A, v37, Issue 11, October 2000, pages 1407-1435, see Abstract and Search report p. 47-48) herein Hamciuc or Hamciuc et al (New silicon containing phenylquinoxaline-imide polymers, High performance polymers (2002), 14(1), pp 63-75, see Search report p.40) herein Hamciuc-2 in combination with Korshak.

Hamciuc teaches fluorinated heterocyclic copolyimides have been synthesized by a polycondensation reaction of a diacid chloride containing imide, hexafluoroisopropylidene and methylene groups with aromatic or heteroaromatic

Art Unit: 1796

diamines containing preformed phenylquinoxaline or 1,3,4-oxadiazole rings (see Abstract).

Regarding Claim 3, Hamciuc teaches polymer with Molecular Weight within the range of 12800-26700.

Regarding Claim 4, Hamciuc-2 teaches a new polyimides with phenylquinoxaline rings (see Abstract and Search report p. 40).

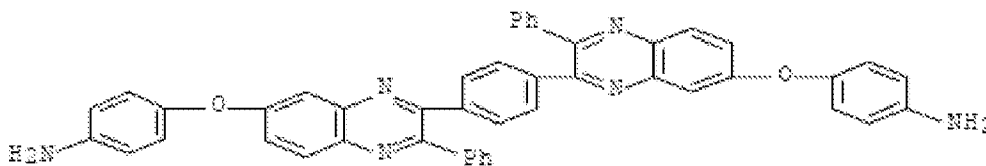
In reference to Claim 5, Hamciuc -2 has more than 1% mol of phenylquinoxaline rings (see Search report, page 40).

Regarding Claims 6-8, Hamciuc -2 teaches phenyl groups in aromatic tetracarboxylic acid dianhydride (see Search report, page 40).

Regarding claims 9-13, Hamciuc -2 teaches fluorescent film with maximum fluorescent range of 415-425 nm (see Search report, p.40).

Hamciuc or Hamciuc -2 does not teach a polyamic acid and polyimide based on a diamine of formula (1). Instead the reference teaches a diamine of the following formula (2) (see Search report, p.47-48):

Art Unit: 1796



The difference between the diamine above and the diamine claimed is that the Hamciuc's material has two additional Aryl ether units.

Korshak teaches diamine, structurally analogous to one of the Application. The advantage of Korshak's diamine over Hamciuc's one is that it provides polymer with higher Tg due to higher stiffness of the diamine (Ph-O link provides more mobility of the diamine molecule). Therefore, polyimides based on Korshak's diamine provide higher modulus, tensile strength and broader temperature range, which is useful for applications at elevated temperatures.

Thus, it would have been obvious to a person of ordinary skills in the art to use Korshak's diamine in Hamciuc's copolyimide in order to achieve higher modulus, tensile strength and broader temperature range, which is useful for the applications at elevated temperatures.

In reference to new claims 14 and 15, Hamciuc or Hamciuc -2 or Korshak does not teach R1 and R2 where R1 and R2 each independently denotes a C1-20 alkyl group, C1-20 alkoxy group, or C1-20 fluoroalkyl group.

Note that limitations of Claim 2 permits R1 and R2 to be C1 (Methyl) alkyl group.

In a case law (see *re Lohr* (CCPA 1963) 317F2D 38, 137 USPQ 548) related to a similar substitution, replacement of two Hydrogen groups to methyl groups was decided unpatentable, since unexpected results due to the above substitution were not shown.

Therefore, it would have been obviously to a person of ordinary skills in the art to interchangeably use methyl substituted or unsubstituted polyimide and polyimide precursor unless unexpected results due to the above substitution were shown.

Response to Arguments

Applicant's arguments with respect to claims have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GREGORY LISTVOYB whose telephone number is (571)272-6105. The examiner can normally be reached on 10am-7pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Seidleck can be reached on (571) 272-1078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1796

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/Rabon Sergent/
Primary Examiner, Art Unit 1796

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Application/Control Number: 10/561,152
Art Unit: 1796

Page 9